

**LISTING OF CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Claim 1 (Currently Amended):**            A stator comprising:  
a stator core having an even number of slots per pole per phase; and  
armature windings contained in said slots, said armature windings being  
wound in a single layer distributed winding,

wherein: the stator core includes:

a yoke portion, and

a plurality of tooth portions projected from one face of the yoke  
portion, each of the slots being formed between adjacent tooth  
portions,

wherein the armature windings comprises:

a first armature winding contained in two of the slots so as to  
bridge the two of the slots,

a second armature winding contained in a first slot arranged  
between the two of the slots and a second slot of the slots so as to  
bridge the first and second slots, the second armature winding being  
different in phase from the first armature winding, and

a third armature winding contained in a third slot arranged  
between the two of the slots and a fourth slot of the slots so as to

bridge the third and fourth slots, the third armature winding being the same in phase as the second armature winding;

wherein the first, second and third armature windings each have a coil end portion; and

wherein the coil end portions of the first, second and third armature windings are projected from the slots in an axial direction of the stator core and arranged in a space facing a side face of the yoke portion by bending the projected coil end portions so as to locate one of the second and third armature windings outside the first armature winding and the other of the second and third armature windings inside the first armature winding, respectively.

~~one of said slots arranged between two of said slots containing a first armature winding contains a second armature winding for a phase different from a phase of said first armature winding,~~

~~one of said slots arranged between said two of said slots containing said first armature winding contains a third armature winding for a phase equal to the phase of said second armature winding, and~~

~~coil end portions of said first, second and third armature windings are arranged within a space on a side face of a back yoke portion of said stator core so that one of said second armature winding and said third armature winding is arranged in an outer peripheral side of said first armature winding, and the other one of said second armature winding and said third armature winding is arranged in an inner peripheral side of said first armature winding.~~

**Claim 2 (Previously Presented):** A stator according to claim 1, wherein said stator core comprises a plurality of core portions formed by laminating segments stamped in a sector; said plurality of core portions being assembled into a cylindrical shape and said armature windings being spread over said core portions into individual slots of said stator core.

**Claim 3 (Currently Amended):** A stator according to any one of claims 1 and 2, wherein a dimension of said stator in an axial direction including said stator core and said coil end portions is reduced by arranging said coil end portions in the space near the side face of the back-yoke portion.

**Claim 4 (Previously Presented):** A rotary electric machine comprising the stator according to any one of claims 1 and 2; and a rotor which is held so as to be arranged opposite to said stator.

**Claim 5 (Previously Presented):** A linear motor comprising the stator according to any one of claims 1 and 2; and a mover which is held so as to be arranged opposite to said stator.

### REMARKS

Claims 1-5 are pending in this application. Claims 1 and 3 have been amended in several particulars for purposes of clarity and brevity that are unrelated to patentability and prior art rejections in accordance with current Office policy, to further and alternatively define Applicants' disclosed invention and to assist the Examiner to expedite compact prosecution of the instant application.

Claims 1 and 4 have been rejected under 35 U.S.C. §102(b) as being anticipated by Emery et al., ("Electric Motors and Generators Illustrated", pp. 108-109, 1959). In support of the rejection of base claim 1, the Examiner asserts that Emery teaches a so-called "mush winding" for stators or rotors (Fig. 12) comprising:

"a stator with a stator core having an **even number of slots per pole per phase** (the stator has forty-eight slots, four poles and three phases; Fig. 12); armature windings contained in said slots, said armature windings being wound in a single layer distributed winding, i.e., "one coil-side per slot", wherein one of said slots arranged between two of said slots containing a first armature winding (e.g., B2) contains a second armature winding (B2), one of said slots arranged between said two of said slots containing said first armature winding (B2) contains a third armature winding (C1) for a phase equal to the phase of said second armature winding (A1), and coil end portions of said first (B2), second (A1) and third (C1) armature windings are arranged within a space on a side face of a back yoke portion of said stator core so that one of said second armature winding (A1) and said third armature winding (C1) is arranged in an outer peripheral side of said first armature winding (B2), and the other one of said second armature winding (A1) and said third armature winding (C1) is arranged in an inner peripheral side of said first armature winding (B2)."

While Applicants disagree with the Examiner's factually assessment of Emery ("Electric Motors and Generators Illustrated"). For purposes of expedition, base claim 1 has been amended to clearly distinguish over Emery. For example, base claim 1, as amended, defines a motor stator comprising:

a stator core having an even number of slots per pole per phase; and

armature windings contained in said slots, said armature windings being wound in a single layer distributed winding,

**wherein the stator core includes:**

a yoke portion, and

a plurality of tooth portions projected from one face of the yoke portion, each of the slots being formed between adjacent tooth portions,

**wherein the armature windings comprises:**

a first armature winding contained in two of the slots so as to bridge the two of the slots,

a second armature winding contained in a first slot arranged between the two of the slots and a second slot of the slots so as to bridge the first and second slots, the second armature winding being different in phase from the first armature winding, and

a third armature winding contained in a third slot arranged between the two of the slots and a fourth slot of the slots so as to bridge the third and fourth slots, the third armature winding being the same in phase as the second armature winding;

wherein the first, second and third armature windings each have a coil end portion; and

wherein the coil end portions of the first, second and third armature windings are projected from the slots in an axial direction of the stator core and arranged in a space facing a side face of the yoke portion by bending the projected coil end portions so as to locate one of the second and third armature windings outside the first armature winding and the other of the second and third armature windings inside the first armature winding, respectively.

In other words, base claim 1 requires that the number of slots per pole per phase must be **even**. For example, the number of slots may be **two (2)** shown in an embodiment of FIG. 1, or alternatively, **four (4)** shown in an embodiment of FIG. 5 of Applicants' disclosure. The stator core must have a yoke portion and a plurality of tooth portions projected from one face of the yoke portion, in which the slots are formed between adjacent tooth portions. In addition, coil end portions of the first, second and third armature windings (U1, V1 and W1) must be projected from the slots in an axial direction of the stator core and arranged in a space facing a side face of a back yoke portion 1a of a stator core 1, as shown in FIG. 1 and FIG. 3, by

bending the projected coil end portions so as to locate the first armature winding (U1) between the second and third armature windings (V1 and W1).

This way the individual windings (U1, V1, W1, for example, as shown in FIG. 1 and FIG. 3) are **not** overlapped as typically associated with conventional motor designs shown in FIG. 10(b) in which the dimension H2 of the coil end portions of the windings (U1, V1 and W1) in an axial direction is large. Instead, the individual windings (U1, V1, W1, for example, as shown in FIGs. 1 and 3) are interweaved and packed (arranged in a spaced near the side face of the back yoke) as shown in FIG. 10(a) so as to reduce the dimension H2 of the coil end portions of the windings (U1, V1, W1). As a result, the thickness of the rotary electric machine can also be reduced.

In contrast to Applicants' base claim 1, Emery discloses a stator, as shown in FIG. 12 and FIG. 13, including a relation between windings and slots in which the windings are contained, and a relation between an end portion of a stator core in its axial direction and coil end portions.

However, Figs. 12 and 13 of Emery do **not** show any structures of the coil end portions when viewing the stator from its axial direction at all. There is **no** disclosure anywhere from Emery of Applicants' claimed "stator core having a yoke portion and a plurality of tooth portions projected from one face of the yoke portion, wherein each of the slots is formed between the adjacent tooth portions" as expressly defined in Applicants' base claim 1. More importantly, there is **no** disclosure from FIG. 12 and FIG. 13 or another other drawings of Emery of Applicants' claimed feature "the coil end portions of the first, second and third armature windings are arranged in a space facing a side face of the yoke portion by bending the coil end portions projected from

the slots in an axial direction of the stator so as to locate one of the second and third armature windings outside the first armature winding and the other of the second and third armature windings inside the first armature winding, respectively,” as expressly defined in Applicants’ base claim 1 and shown in FIG. 1 of Applicants’ disclosure.

The Examiner seems to interpret that a space in which the coil end portions projected from the slots in the axial direction of the stator are arranged falls within the limitation “a space facing a side face of the yoke portion” of Applicants’ base claim 1. However, such an interpretation is factually incorrect. This is because the space as expressly defined in Applicants’ base claim 1 indicates a space which is located along a radial direction of the stator core, outside the space in which the coil end portions projected from slots in the axial direction of the stator are arranged, in an embodiment shown in FIG. 1, and indicates a space which is located below the space in which the coil end portions projected from the slots in the axial direction of the stator are arranged, in an embodiment shown in FIG. 7.

Again, the rule under 35 U.S.C. §102 is well settled that anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. In re Paulsen, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Those elements must either be inherent or disclosed expressly and must be arranged as in the claim. Richardson v. Suzuki Motor Co., 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989); Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); Verdegall Bros., Inc. v. Union Oil Co., 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987). The limitations required by the claims cannot be ignored. See In

re Wilson, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970). All claim limitations, including those which are functional, must be considered. See In re Oelrich, 666 F.2d 578, 212 USPQ 323 (CCPA 1981). In other words, all words in a claim must be considered in deciding the patentability of that claim against the prior art. Each word in a claim must be given its proper meaning, as construed by a person skilled in the art. Where required to determine the scope of a recited term, the disclosure may be used. See In re Barr, 444 F.2d 588, 170 USPQ 330 (CCPA 1971).

The corollary of the rule under 35 U.S.C. §102 is that absence from the reference of any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 230 USPQ2d 81 (Fed. Cir. 1986).

In the present situation, Emery fails to disclose and suggest the many features of Applicants' base claim 1, including, for example, "the stator core having a yoke portion and a plurality of tooth portions projected from one face of the yoke portion, wherein each of the slots is formed between the adjacent tooth portions" and wherein "the coil end portions of the first, second and third armature windings are projected from the slots in an axial direction of the stator core and arranged in a space facing a side face of the yoke portion by bending the projected coil end portions so as to locate one of the second and third armature windings outside the first armature winding and the other of the second and third armature windings inside the first armature winding, respectively". In view of the absence of these features from Emery, Applicants respectfully request that the rejection of base claim 1 and its dependent 4 be withdrawn.

Claim 3 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Emery in view of Payen, U.S. Patent No. 3,622,818 for reasons stated on pages



3-4 of the Office Action. Claims 2 and 4 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Emery in view of Kakutani, U.S. Patent No. 6,141,865 for reasons stated on page 4 of the Office Action. Likewise, claim 3 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Emery in view of Kakutani, U.S. Patent No. 6,141,865 as applied to claim 2, and further in view of Payen, U.S. Patent No. 3,622,818 for reasons stated on pages 4-5 of the Office Action. Lastly, claim 5 has been rejected under 35 U.S.C. §103 as being unpatentable over Emery in view of Auinguer, U.S. Patent No. 4,127,787, and alternatively, over Emery in view of Auinguer, U.S. Patent No. 4,127,787 and Kakutani '787 for reasons stated on page 5 of the final Office Action. Since these rejections are predicated upon the correctness of the rejection of base claim 1, Applicants respectfully traverse these rejections for the same reasons discussed against the rejection of base claim 1, namely that Emery, as a primary reference, does **not** disclose Applicants' features, including "the stator core having a yoke portion and a plurality of tooth portions projected from one face of the yoke portion, wherein each of the slots is formed between the adjacent tooth portions" and wherein "the coil end portions of the first, second and third armature windings are projected from the slots in an axial direction of the stator core and arranged in a space facing a side face of the yoke portion by bending the projected coil end portions so as to locate one of the second and third armature windings outside the first armature winding and the other of the second and third armature windings inside the first armature winding, respectively". As a result, all secondary references cited do **not** remedy the noted deficiencies of Emery in order to arrive at Applicants' claims 2-5.

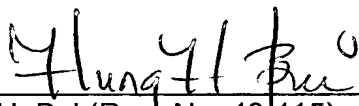
In view of the foregoing amendments, arguments and remarks, all claims 1-5 are deemed to be allowable and this application is believed to be in condition to be passed to issue. Should any questions remain unresolved, the Examiner is requested to telephone Applicants' attorney at the Washington DC area office at (703) 312-6600.

To the extent necessary, Applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage of fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, No. 01-2135 (Application No. 503.39902X00), and please credit any excess fees to said deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By

  
Hung H. Bui (Regl No. 40,415)  
Attorney for Applicant(s)

HHB:btd

1300 North Seventeenth Street, Suite 1800  
Arlington, Virginia 22209  
Tel.: (703) 312-6600  
Fax: (703) 312-6666